Universiti Teknologi MARA

Queue Management Mobile Application with Geo-fencing

Muhammad Aminuddin bin Abdul Basir

Thesis submitted in fulfilment of the requirements for Bachelor of Computer Science (Hons.) Netcentric Computing Faculty of Computer and Mathematical Sciences

January 2019
ABSTRACT

Queuing can be cumbersome, tedious, and sometimes unsystematic which is inefficient and cause people leave or not join the queue to begin with. A survey have been conducted at two public organizations to determine time taken for user to complete their queue and to observe the current queueing system available at most premises. Most premises or organizations use ticket based queueing system where user have to predict the status of the queue themselves and have to come to the premises to join queue without proper planning. The problems with current queueing system is cause fatigue, wasted waiting time, and inadequate information about the current situation of the queue. With the increasing use of mobile phone and internet accessibility, mobile queuing can be implemented where user can take part in the queue via mobile device without them to come to the premises. Hence, development of SmartQ which is a queue management mobile application with geo-fencing feature can tackle this issue by implementing the mobile queueing for two organization. This mobile application also support multi-organization queue where this project is combined with other project, SmartQ: Real-Time Multi-organization Queue Management System using Predictive Modelling. This mobile applications also aid user to get information about the current status of queue at the organization such as number of people in queue and estimated waiting time. The geo-fence feature help the organization to limit number of user that can join queue within certain range from the premise. Functionality test and geo-fence accuracy test is conducted to test the functionality of the mobile application and to measure the accuracy of the geo-fence feature. Functionality test was conducted to determine each function of mobile application is up to specification and accuracy test of geo-fence features is conducted to test how accurate the geo-fence limit the user from take part in the queue given their location. In the future, this mobile application can be improved by including more organizations and allowing users to join queue from multiple organizations from different locations.
# TABLE OF CONTENT

## CONTENTS

<table>
<thead>
<tr>
<th>SUPERVISOR APPROVAL</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDENT DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>Error! Bookmark not defined.</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>ix</td>
</tr>
</tbody>
</table>

## CHAPTER ONE: INTRODUCTION

1.1 Background of Study 1
1.2 Problem Statement 3
1.3 Project Objectives 4
1.4 Individual Project Scope 4
1.5 Group Project Scope 5
1.6 Project Significance 5
1.7 Summary 6

## CHAPTER TWO: LITERATURE REVIEW

2.1 Queue Management System 7
  2.1.1 Queuing Model 7
  2.1.2 Type of Queue Management System 9
2.2 Mobile Application (Android) 10
  2.2.1 Android Operating System (OS) 11
  2.2.2 Android Architecture 11
  2.2.3 Android Studio Overview 14
  2.2.4 Java vs Android Java 15
2.3 Location Based Service 16
  2.3.1 Geo-fencing 16
2.3.2 Google Maps SDK 17
2.3.3 Location Based Service Accuracy 17
2.4 Related Work 17
   2.4.1 An IoT Smart Queue Management System with Real-Time Queue Tracking 18
   2.4.2 Disaster Mitigation Management Using Geo-fencing in Indonesia 19
   2.4.3 Empirical Study: Implementing a Remote Queuing Product 20
   2.4.4 Related Work Comparison 21
2.5 Chapter Summary 22

CHAPTER THREE: METHODOLOGY 23
   3.1 System Development Life Cycle (SDLC) Approach 23
   3.2 Planning and Requirement Gathering Phase 26
   3.3 Analysis Phase 27
      3.3.1 Hardware and Software Requirement 27
   3.4 Design Phase 29
      3.4.1 System Flowchart 29
      3.4.2 Data Flow Diagram 31
      3.4.3 System Architecture Diagram 32
      3.4.4 Group Project Design 33
   3.5 Development Phase 33
   3.6 Testing Phase 34
   3.7 Documentation and Presentation Phase 35
   3.8 Chapter Summary 35

CHAPTER ONE: INTRODUCTION 36
   4.0 User Interface 36
   4.1 Result 44
   4.2 Test 1: Functionality Testing 45
   4.3 Test 2: Accuracy Testing of Geo-fence Features 47
   4.4 Chapter Summary 51

CHAPTER ONE: INTRODUCTION 52
   5.1 Conclusion 52
   5.2 Project Limitation 53
   5.3 Future Recommendation 53
   5.4 Chapter Summary 54

REFERENCE 58